

Amendments to the Claims:

This listing of the claims will replace all prior versions, and listings, of claims in the application:

Listing of the Claims:

1. (Currently amended) A fuel cell system comprising:
a reaction vessel having a catalyst carried in the vessel for promoting an endothermic reaction, the reaction vessel being constructed and arranged to allow endothermic reactants to be charged into the vessel, and further comprising at least a first and a second of heat exchanger device spaced apart from each other and carried within the vessel, and wherein the first and second heat exchanger devices are constructed and arranged to be independently controlled from each so that heat transferred by the heat exchanger devices to the catalyst, and the temperature of the catalyst, may be varied at different locations within the reaction vessel corresponding to the location of the first and second heat exchanger devices, and wherein the reaction vessel comprises a plurality of parallel substrates, each of the substrates having a first and a second surface, and an endothermic reaction catalyst overlying the first surface, and an exothermic reaction catalyst overlying the second surface, and wherein each of the substrates is constructed and arranged to transfer heat from the second surface to the first surface.

2. (Currently amended) A fuel cell system as set forth in claim 1 wherein the reaction vessel is constructed and arranged so that exothermic reactants may be charged into each heat exchanger device and wherein the exothermic reactants comprising a fuel and an oxidant, and wherein each of the heat exchanger devices includes at least one combustion chamber, ~~and wherein a catalyst for promoting chemical combustion is carried in each combustion chamber,~~ and wherein at least one of the fuel and the oxidant are selectively charged

to each combustion chamber in a controlled amount so that the heat generated by each of the heat exchanger devices may be varied as desired.

3. (Currently amended) A fuel cell system comprising:

a reaction vessel including a plurality of endothermic reaction sections, and a plurality of heat transfer devices, wherein each endothermic reaction section has a heat transfer device associated therewith to supply sufficient heat to control the temperature profile of the associated endothermic reaction section within a predetermined range, and wherein each endothermic reaction section comprises a substrate shared by an adjacent heat transfer device.

4. (Original) A fuel cell system as set forth in claim 3 wherein the endothermic reaction sections are spaced apart and wherein the heat transfer device is positioned between two spaced apart endothermic reaction sections.

5. (Original) A fuel cell system as set forth in claim 4 wherein each heat transfer device comprises at least one catalytic combustion chamber having a catalyst therein for combusting a combustion fuel mixture in the catalytic combustion chamber.

6. (Original) A fuel cell system as set forth in claim 5 further comprising a fuel cell stack, and wherein the combustion fuel mixture comprises anode and cathode exhaust from the fuel cell stack.

7. (Original) A fuel cell system as set forth in claim 3 wherein each endothermic reaction section includes a catalyst supported on at least one selected from the group of a ceramic and metal monolith.

8. (Original) A fuel cell system as set forth in claim 3 wherein each of the endothermic reaction sections includes a catalyst supported on a foam.

9. (Original) A fuel cell system as set forth in claim 3 wherein the reaction vessel is constructed and arranged so that the exhaust from a first endothermic reaction section flows over a heat transfer device before flowing into a second endothermic reaction section.

Claims 10-13 (Withdrawn).

14. (Currently amended) A fuel cell system comprising:
a reaction vessel integrating an exothermic reaction and an endothermic reaction, the reaction vessel including a ~~substrate~~ plurality of substrates, each of the substrates having a first and a second surface, and an endothermic reaction catalyst overlying the first surface, and an exothermic reaction catalyst overlying the second surface, and wherein ~~the substrate~~ each of the substrates is constructed and arranged to transfer heat from the second surface to the first surface.

15. (Original) A fuel cell system as set forth in claim 14 wherein the first and second surfaces are located on opposite sides of the substrate.

16. (Original) A fuel cell system as set forth in claim 14 wherein the substrate has a substantially flat planar configuration.

17. (Currently amended) A fuel cell system comprising:

an integrated exothermic and endothermic reaction vessel having an a plurality of exothermic reaction ~~chamber~~ chambers and an a plurality of endothermic reaction ~~chamber~~ chambers and a substrate separating one of the exothermic reaction ~~chamber~~ chambers from one of the ~~and~~ endothermic reaction ~~chamber~~ chambers adjacently positioned thereto and wherein the substrate has a first surface facing inward toward the exothermic reaction chamber and further including an exothermic reaction catalyst overlying the first surface, and wherein the substrate has a second surface facing inward toward the endothermic reaction chamber and further including an endothermic reaction catalyst overlying the second surface, and wherein the integrated reaction vessel is constructed and arranged so that reactants may be selectively supplied to the exothermic reaction chamber to produce reaction products and heat, and so that at least a portion of the heat is transferred through the substrate to the second surface to drive an endothermic reaction occurring in the endothermic reaction chamber.

18. (Currently amended) A fuel cell system comprising:

an integrated chemical combustion and fuel reformation vessel having a chemical combustion ~~chamber~~ chambers and a fuel reformation ~~chamber~~ chambers and a substrate separating the an adjacent chemical combustion chamber from the an adjacent fuel reformation chamber, and wherein the substrate has a first surface facing inward toward the chemical combustion chamber and further including a combustion catalyst overlying the first surface, and wherein the substrate includes a second surface facing inward toward the fuel reformation chamber and further including a reformation catalyst overlying the second surface, and wherein the integrated chemical combustion and fuel reformation vessel is constructed and arranged to supply combustion reactants to the chemical combustion chamber for reaction therein to produce combustion products and heat, and so that at least a portion of the heat is transferred through the substrate to the second surface in an amount sufficient to selectively reform a desired amount of the fuel supplied to the fuel reformation chamber.

Claims 19-34 (Withdrawn).

35. (Currently amended) A fuel cell system comprising:

a reaction vessel including a plurality of vaporizer section sections for vaporizing a fuel and water mixture, and a plurality of heat transfer devices wherein each heat transfer device is device adjacent to the vaporizer section at least one of the vaporizer sections and wherein each vaporizer section includes a substrate shared by the adjacent heat transfer device to supply a sufficient amount of heat to vaporize the mixture, and further comprising a plurality of endothermic reaction sections, and a plurality of additional heat transfer devices, wherein each endothermic reaction section has a heat transfer device associated therewith to supply sufficient heat to control the temperature profile of the associated endothermic reaction section within a predetermined range.

36. (Currently amended) A fuel cell system comprising:

a reaction vessel including a plurality of endothermic reaction sections and a plurality of exothermic reaction sections, and wherein each endothermic reaction section has an exothermic reaction section associated therewith to supply sufficient heat to control the temperature profile of the associated endothermic reaction section within a predetermined range, and wherein each endothermic reaction section comprises a substrate shared by an adjacent exothermic reaction section.

37. (Original) A fuel cell system as set forth in claim 36 wherein the exothermic reaction section includes a catalyst therein for combusting a fuel.

38. (Currently amended) A fuel cell system as set forth in claim 36 wherein the exothermic reaction section is constructed and arranged to charge hydrogen and oxygen into the exothermic reaction chamber section.

39. A fuel cell system as set forth in claim 36 wherein the exothermic reaction chamber section is constructed and arranged to conduct a preferential oxidation reaction therein.